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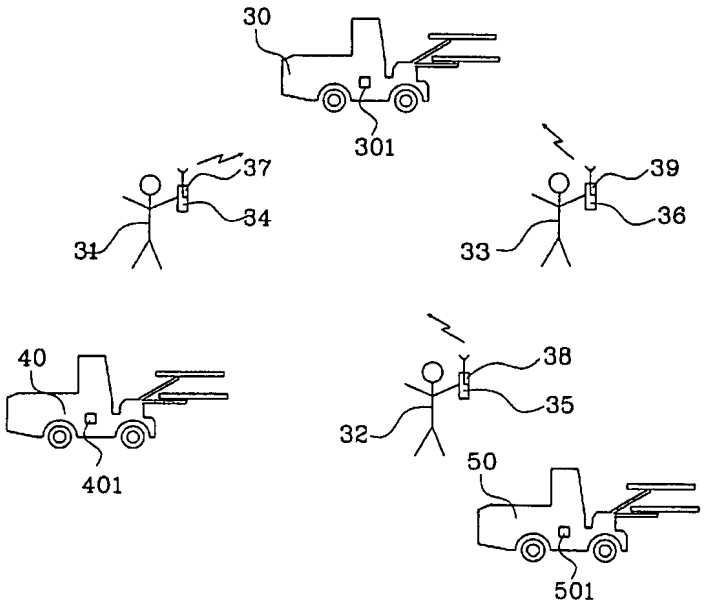
(54) Title: METHOD AND SYSTEM FOR PARAMETER SETTINGS



(57) Abstract: Method for setting at least one rock drilling equipment (30, 40, 50) function parameter, which rock drilling equipment (30, 40, 50) comprises functions arranged to be operated by manoeuvring means, where the effect of the manoeuvring means for one function is dependent on said function parameter. When setting said function parameter, at least one value for the function parameter is transmitted to the rock drilling equipment (30, 40, 50) from a portable unit (34, 35, 36) via a wireless interface. The invention further relates to a system.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Method and system for parameter settings

Field of the invention

The present invention relates to rock drilling equipments, and particularly to a method for setting rock drilling equipment function parameters according to the preamble of claim 1.

The present invention further relates to a system according to the preamble of claim 10.

Background of the invention

Rock drilling equipment may be used in a number of areas. For example, rock drilling equipment may be used in tunnelling, underground mining, rock reinforcement and raise boring.

These applications often use big machines that are complex and very expensive. Further, the machines often work in a very exposed environment with tasks that in short time give rise to wear and limited functionality.

The current machines often have an internal computerized control system that among other things collect status information for a number of functions. These functions may consist of e.g. oil temperatures, hydraulic pressures, penetration rate etc. The control system may further create event and error logs in order to enable subsequent analysis of what has happened and when. The control system may further collect statistics of how the machine has been working and how much.

The control system is further used to supply control signals to various means on the rock drilling equipment, e.g. a hydraulic cylinder, an engine, or a percussion mechanism. An

operator that wishes to affect these means uses manoeuvring means in the form of e.g. a control stick. The signals of the manoeuvring means to the means that is to be operated is then affected by the control system by way of various function parameters, such as e.g. drill pressure setting values, feeding values, percussion values, settings for movement of the rock drilling equipment or settings for any other means in connection to the function of the rock drilling equipment. The value of these rock drilling parameters may in simpler systems be adjusted by e.g. potentiometers, while in computerized systems the function parameters may be adjusted via e.g. a keyboard or a touch sensitive display. The function parameters are often set to a certain value in the manufacturing plant, but are later adjusted by an operator in order to make the machine work according to the operator's desires. Different work situations may require different function parameter settings, just as operators work differently and therefore want different function parameter settings.

Operator is here intended to mean any of driller, service personnel of a manufacturer's customer, the manufacturer's service personnel, or any other person with tasks connected to the rock drilling equipment.

Operators may further want personal settings of the machine display or monitor, e.g. in which language information is to be presented or which colours that are to be used.

A problem with the current systems is that it is difficult for an operator to set his own function parameters.

Another problem with the current systems is that it is hard for an operator to use his personal settings when changing machines.

Summary of the invention

The object of the present invention to provide a method for setting rock drilling equipment function parameters that solves the above mentioned problems.
This object is achieved by a method according to claim 1.

Another object of the present invention to provide a system for setting rock drilling equipment function parameters that solves the above mentioned problems.

This object is achieved by a system according to claim 10.

When setting a function parameter, at least one value for the function parameter is transmitted to the rock drilling equipment from a portable unit, e.g. a smartcard, an ID card, a Bluetooth transponder, a computer or a hand-hold computer, e.g. a PDA (Personal Digital Assistant), via a wireless interface. This has the advantage that the operator easily gets access to his personal function parameter settings without inputting them via a keyboard or connection of some external unit to the machine.

In a preferred embodiment function parameter settings are transmitted to the rock drilling equipment when a portable unit is within a certain distance from the rock drilling equipment. This has the advantage that as soon as an operator comes near the rock drilling equipment he may automatically get the rock drilling equipment adjusted according to his personal function parameter settings.

It is preferred that when the portable unit is removed from the rock drilling equipment by more than a certain distance, the function parameters may be reset to their previous values, such that the machine again is available with a functioning standard/initial setting of the function parameters.

The transmission may be carried out automatically or be user initiated. The former has the advantage that operator doesn't have to do anything when he arrives at the machine, the function parameters are immediately correctly set when he takes seat in the machine. The latter has the advantage that resetting of a machine does not happen accidentally if an operator happens to come near another machine that is working.

Each operator may best dispose an own portable unit with his own function parameter settings programmed. Thereby each operator always gets access to his personal function parameter settings when he is to take a machine into use. The portable unit may e.g. be integrated with the operator's ID card.

In an aspect of the invention the operator's function parameter settings may be transmitted from the rock drilling equipment to the portable unit. In this way an operator may easily store new function parameter settings in his portable unit when he has made function parameter adjustments that works better.

The function parameters may consist of various settings for hydraulic cylinder, percussion mechanism, drill pressure, graphical settings, language settings, drill settings, settings for the movement of the rock drilling equipment or settings for any other means in connection to the function of the rock drilling equipment.

Brief description of the drawings

The invention will now be explained more in detail my means of embodiments and with reference to the attached drawings, of which:

Fig. 1 shows an example of a control system in a rock drilling equipment.

Fig. 2 shows a preferred embodiment of the present invention.

Fig. 3 shows an example of the use of the present invention.

Detailed description of preferred embodiments of the invention

In the following description of the invention the term machine is used to a large extent instead of rock drilling equipment.

Fig. 1 depicts an example of a structure of a rock drilling equipment control system 1. In this case, the control system 1 is built up around a CAN bus 2 (Controller Area Network). The CAN bus is a two wire serial bus, which is working with high data integrity and which is suitable for use in environments with much disturbance. A MMI (Man Machine Interface) interface 3, which can be used by an operator to communicate with the control system 1, is connected to the CAN bus 2. A central unit 4, which controls and supervises the system, is also connected to the bus 2. The bus is further provided with a number of input/output units 5, 6, 7 (I/O-units) for communication with various parts of the rock drilling equipment. These I/O-units may for example be used to provide control signals to the means that control movement of the rock drilling equipment. These means may consist of the engine(s) that controls advances of the equipment, or, when the rock drilling equipment comprises one or more drilling booms, control of the movement and function of the drilling booms.

In the control system, preferably in the central unit 4 or in a separate memory module 8, there is further stored various function parameter setting values. These may consist of various setting values for e.g. hydraulic cylinders, percussion mechanisms, drill pressure or other settings. The function parameters may further consist of settings for the MMI-unit settings, e.g. which language data is to be presented in.

The function parameters are often tried out at the machine manufacturing in order to provide it with an initial setting such that the machine works properly at the delivery. However, an operator that after that uses the machine often has his own desires on how the machine should work and therefore often wishes to adjust the function parameter settings in order for the machine to work according to his desires. The operator may have his own desires on e.g. how the machine should act during movement or how the drilling booms or suchlike things should move. Further, different operators often drill in different ways, some drill more aggressive while others drill softer, and different operators therefore have different desires, which may reflect on function parameter settings.

Setting of these function parameters according to the prior art may be tiresome and may easily cause errors, which leads to a machine that does not work in an optimum way. It may also be difficult to reset the parameter values to the initial settings if many changes have been made and the machine because of this does not function properly. Further, it is difficult for an operator to save a properly functioning setting that he is satisfied with. It may require that he writes all setting values on a piece of paper to be able to

reuse the machine settings at a later occasion when someone else has been using the machine meanwhile or to be able to bring the settings to another machine.

The present invention aims to simplify function parameter settings.

In fig. 2 a preferred embodiment of the present invention is shown. The figure shows a control system according to fig. 1 that has a new unit 20 connected to the bus 2. The unit 20 communicates with the rest of the control system and has a transmitter and/or receiver to be able to transmit and receive data wirelessly. Further, a receiver unit 21 is provided with a transmitter and/or receiver 22 for wireless communication. In this described embodiment the wireless interface consists of a Bluetooth interface.

Bluetooth is a method/protocol for short distance communication between various units in the frequency band 2.4-2.5 GHz. The communication usually takes place between units that are within 10 meters from each other. Bluetooth represents prior art and will not be described more in detail.

The function of the invention will now be described more in detail with reference to fig. 3.

In fig. 3, rock drilling equipments 30, 40, 50 provided with units 301, 401, 501 for Bluetooth communication is shown. Further, the figure shows a number of operators 31, 32, 33 of the rock drilling equipments 30, 40, 50. The operators are provided with portable units 34, 35, 36, which comprise means 37, 38, 39 for Bluetooth communication. The portable units consist of a smartcard, an ID card, a computer or hand-hold

computer, e.g. a Personal Digital Assistant (PDA), with integrated Bluetooth functionality.

The operators function parameter settings are programmed in the portable units 34, 35 and 36, respectively. When an operator 31 with a portable unit 34 is to take a rock drilling equipment 30 into use he no longer has to input the function parameter settings via the MMI unit. When he comes within a radius of approximately 10 m from the machine a communication link according to the Bluetooth technology is established between the machine and the portable unit 34, whereupon the function parameter settings that are stored in the portable unit 34 is transmitted to the rock drilling equipment 30. The data transmission may be arranged to be carried out automatically as soon as a communication link is established, i.e. as soon as the portable unit 34 comes within range of the rock drilling equipment 30. Thereby the operator quick and easy gets the machine set according to his own desires and may at once go on with his tasks.

When the operator leaves the rock drilling equipment the control system, when the operator with the portable unit has come out of reach of the Bluetooth unit in the machine, may reset to the previous parameter settings of the machine. In this case the previous parameter settings have been stored in a memory meanwhile so that they may be reused. The memory may for example consist of a separate unit that is connected to the control system bus or be integrated in the central unit of the control system. Alternatively, if the rock drilling equipment lacks possibility to store previous parameter settings, the latest set of parameter settings will be valid until another operator puts the rock drilling equipment into use with other function parameter settings.

During a shift the operator may perform additional adjustments of the function parameters in order to get the machine to function even more according to the operator's desires. The portable unit may therefore have a possibility to receive function parameter settings from the rock drilling equipment. In this way the operator, when finishing a shift, may, e.g. via the MMI unit, choose to transmit the current function parameter settings of the rock drilling equipment to the portable unit so that the operator may use these settings the next time the same, or another similar machine, is taken into use by the operator.

However, if the operator observes that he has made a number of function parameter changes that deteriorate the function of the machine, he may simply reset the machine to the settings of the beginning of the shift since these are stored in the portable unit.

If the operator by accident would have stored the function parameter settings that give deteriorated performance, he may send for e.g. service personnel with an own portable unit in order to quickly set the machine to function properly again.

Preferably, each operator has his own personal portable unit with function parameter settings programmed. The portable unit may e.g. consist of an ID card with integrated functionality to be able to send function parameter settings to the rock drilling equipment.

The described method for transmission of function parameter settings may be combined with the method for identification of a user, which is described in the co-pending application

0104382-7. In this case user login and function parameter setting transmission is carried out concurrently, whereupon the user at once gets access both to his personal settings and the functions he has the right to use.

In the above described embodiment the transmission of function parameter settings is carried out as soon as the rock drilling equipment and the portable unit comes within a certain distance from each other. It may, however, be suitable that the transmission is user initiated. This may be solved in a simple manner, e.g. by carrying out the transmission as soon as the portable unit is turned on, provided that the rock drilling equipment and the receiver unit are within range of each other, or that transmission only may take place after a user of the portable unit has activated some process or function in the portable unit or in the rock drilling equipment. This may be necessary when several operators are present at the same machine, or if an operator often passes other machines.

In the above examples the control system unit for wireless communication has been described as a separate unit that is connected to the bus. It should be understood, however, that this unit may as well be integrated in any other unit belonging to the control system, e.g. the central unit.

Further, the invention has been described with a Bluetooth based interface. The invention may however be realised with an arbitrary wireless interface, e.g. an IR interface or any other radio interface, such as GSM or WLAN.

Claims

1.Method for setting at least one rock drilling equipment (30, 40, 50) function parameter, which rock drilling equipment (30, 40, 50) comprise functions arranged to be operated by manoeuvring means, where the effect of the manoeuvring means on a function is dependent on said function parameter, **characterized in** that when setting said function parameter, at least one value for the function parameter is transmitted to the rock drilling equipment (30, 40, 50) from a portable unit (34, 35, 36) via a wireless interface, where the transmission is done following initiation by a user.

2. Method according to claim 1, **characterised in** that said value or values are stored in a memory connected to a control unit in the rock drilling equipment (30, 40, 50).

3. Method according to claim 1, **characterised in** that said value or values are stored in a memory integrated ina control unit in the rock drilling equipment (30, 40, 50).

4. Method according to any of the claims 1-3, **characterised in** that the portable unit (34, 35, 36) consists of any one from the group: Bluetooth transponder, smartcard, ID card, computer or hand-hold computer, e.g. a PDA (Personal Digital Assistant).

5. Method according to any of the claims 1-4, **characterised in** that said value or values are transmitted to the rock drilling equipment (30, 40, 50) when the portable unit (34, 35, 36) is within a certain distance from the rock drilling equipment (30, 40, 50).

6. Method according to any of the claims 1-5, where the rock drilling equipment (30, 40, 50) is used by two or more operators, **characterised in** that each operator is provided

with a portable unit (34, 35,36) from which for the operator specific value or values are transmitted to the rock drilling equipment (30, 40, 50).

7. Method according to any of the claims 1-6, **characterised in** that a value or values for a rock drilling equipment (30, 40, 50) function parameter is transmitted to the portable unit (34, 35, 36) via the wireless interface.

8. Method according to any of the claims 1-7, **characterised in** that the wireless interface consists of a Bluetooth interface, a GSM interface, an IR-interface, WLAN or any other radio interface.

9. Method according to any of the claims 1-8, **characterised in** that the functions may consist of any of the group: hydraulic cylinder movements, percussion mechanism movements, drill pressure, graphical settings, language settings, drill settings or movement of the rock drilling equipment.

10.System for setting at least one rock drilling equipment (30, 40, 50) function parameter, which rock drilling equipment (30, 40, 50) comprise functions arranged to be operated by manoeuvring means, where the effect of the manoeuvring means on a function is dependent on said function parameter, **characterized in** that the rock drilling equipment (30, 40, 50) is arranged to receive at least a one value for the function parameter from a portable unit (34, 35, 36) via a wireless interface, where the transmission is done following initiation by a user.

11. System according to claim 10, **characterised in** that the portable unit consists of any one from the group: Bluetooth transponder, smartcard, ID card, computer or hand-hold computer, e.g. a PDA (Personal Digital Assistant).

12. System according to claim 10 or 11, **characterised in** that the rock drilling equipment (30, 40, 50) is arranged to receive said value or values from the portable unit (34, 35, 36) when the portable unit is within a certain distance from the rock drilling equipment (30, 40, 50).

13. System according to any of the claims 10-12, **characterised in** that the portable unit (34, 35, 36) is arranged to receive a value or values for the function parameter from the rock drilling equipment (30, 40, 50).

14. System according to any of the claims 10-13, **characterised in** that the wireless interface consists of a Bluetooth interface, a GSM interface, an IR-interface, WLAN or any other radio interface.

Fig. 1

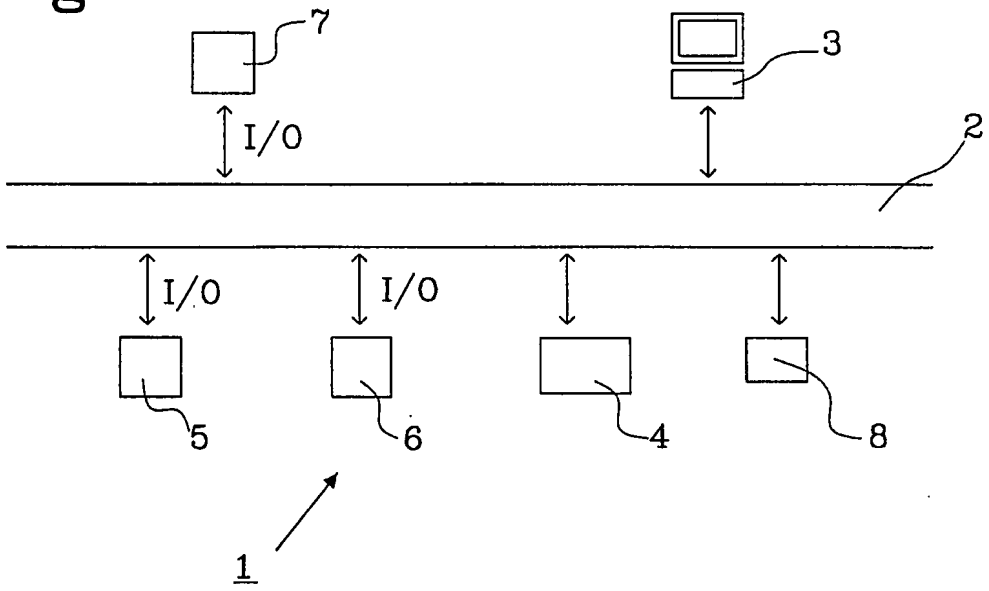


Fig. 2

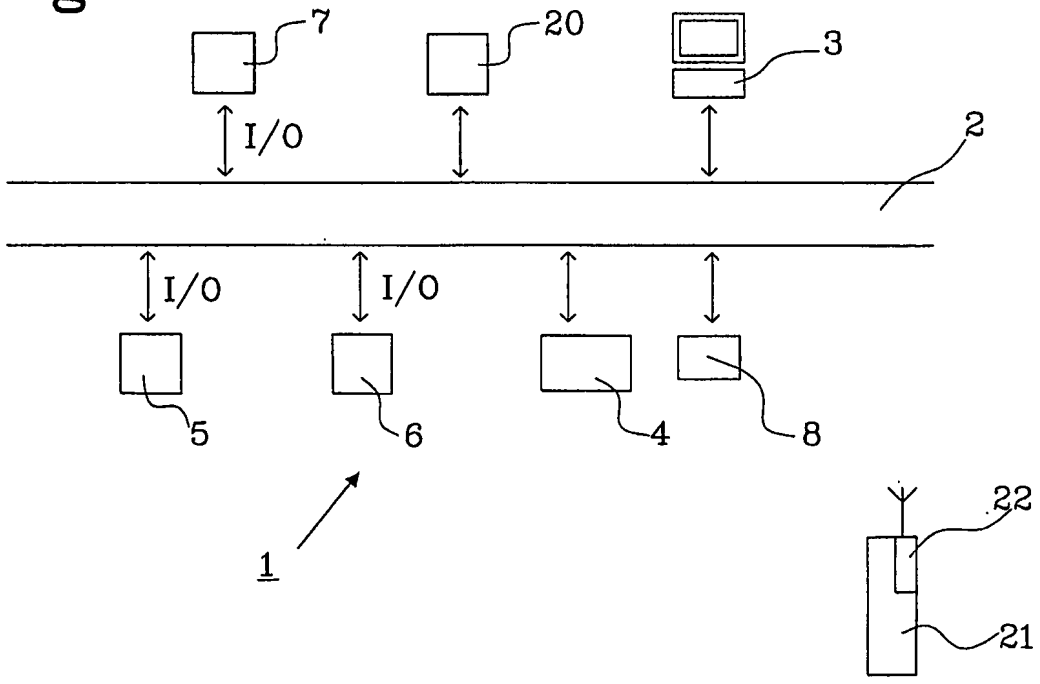
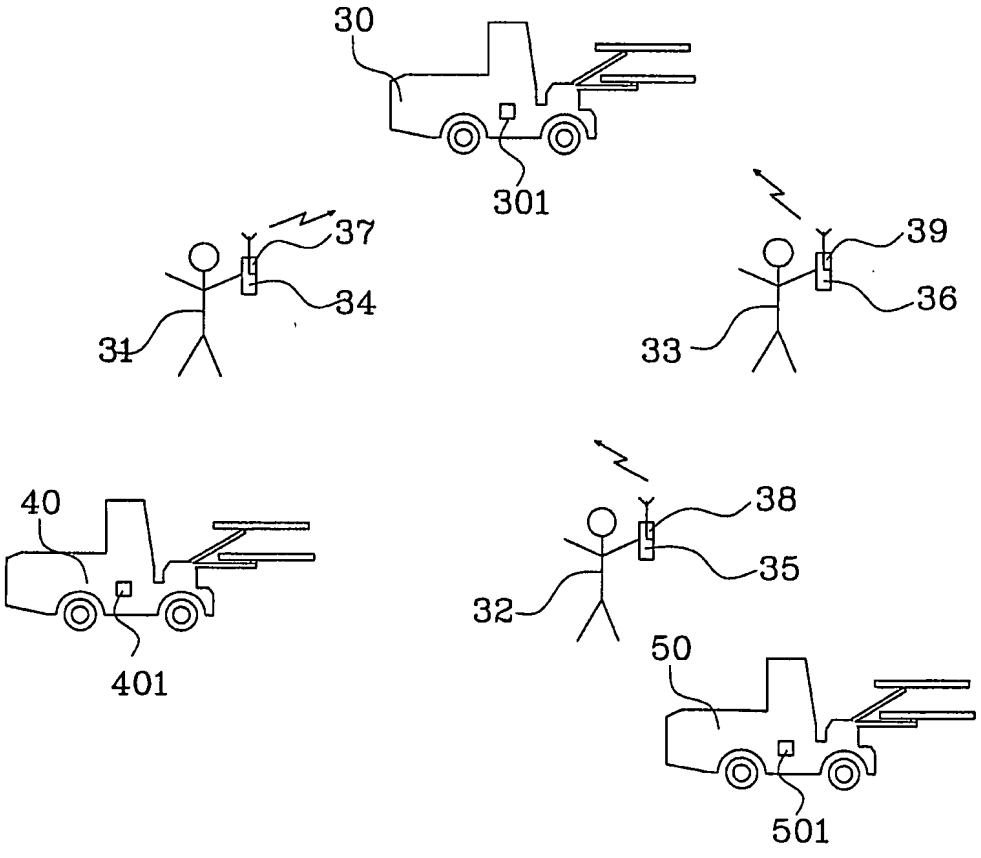


Fig. 3



INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 02/02376

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G08C 17/02, H04Q 9/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q, G08C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 19904122 A1 (BITZER, K.), 10 August 2000 (10.08.00), column 2, line 24 - line 54, abstract ---	1-14
X	WO 0072463 A2 (JOHNSON CONTROLS INTERIORS TECHNOLOGY CORP), 30 November 2000 (30.11.00), page 14, line 9 - line 19, abstract --- ---	1-14

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Jenny Forss/LR Telephone No. +46 8 782 25 00

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INTERNATIONAL SEARCH REPORT

Information on patent family members

30/12/02

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19904122 A1	10/08/00	NONE	
WO 0072463 A2	30/11/00	EP 1194903 A	10/04/02
		EP 1246414 A	02/10/02
		US 2002197955 A	26/12/02